# Jordan University of Science and Technology

## Faculty of Engineering

## Mechanical Engineering Department

| ME451 Heat Transfer - JNQF Level: 7 |
|---|
| First Semester 2023-2024 |

| Course Catalog |
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| 3 Credit Hours. Modes of heat transfer, Steady heat conduction, Thermal resistance method, Transient heat conduction, Convection and Radiation heat transfer, Heat balance method, Heat transfer correlations, Heat exchangers. |

| Text Book | |
|---|---|
| **Title** | Heat Transfer: A practical Approach |
| **Author(s)** | Y. Cengel, |
| **Edition** | 5th Edition |
| **Short Name** | Cengel, |
| **Other Information** | |

**Course References**

| Short name | Book name | Author(s) | Edition | Other Information |
|---|---|---|---|---|
| Incropera and D.P. DeWitt | Fundamentals of Heat and Mass Transfer | Incropera and D.P. DeWitt | 6th Edition | |
| Incropera et al. | Principles of Heat and Mass Transfer,. | F. Incropera, D. DeWitt, T. L. Bergman and A. S. Lavine | 7th Edition | |
| Arpaci, et al. | Introduction to Heat Transfer, | V. Arpaci, S. Kao and A. Selamet. | 1st Edition | |

| Instructor | |
|---|---|
| Name | **Prof. SAUD KHASHAN** |
| Office Location | - |

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|---|---|
| Office Hours | Sun : 10:30 - 12:00<br>Mon : 13:00 - 14:30<br>Tue : 11:00 - 12:30<br>Thu : 12:00 - 13:30 |
| Email | sakhashan@just.edu.jo |

| Class Schedule & Room |
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| Section 2:<br>Lecture Time: Mon, Wed : 11:30 - 13:00<br>Room: M2006 |

| Prerequisites | | |
|---|---|---|
| **Line Number** | **Course Name** | **Prerequisite Type** |
| 253431 | ME343 Fluid Mechanics | Prerequisite / Study |
| 253220 | ME322 Thermodynamics (2) | Prerequisite / Study |
| 253053 | ME305 Applied Math For Engineers | Prerequisite / Study |

| Tentative List of Topics Covered | | |
|---|---|---|
| **Weeks** | **Topic** | **References** |
| Week 1 | Modes of heat transfer | **chapter 1** From **Cengel,**, **chapter 1** From **Incropera and D.P. DeWitt** |
| Weeks 2, 3 | Heat Conduction Equation | **Chapter 2** From **Cengel,**, **Chapter 2** From **Incropera and D.P. DeWitt** |
| Weeks 3, 4, 5 | Steady state conduction | **Chapter 3** From **Cengel,**, **Chapter 3** From **Incropera and D.P. DeWitt** |
| Weeks 5, 6 | Transient one dimensional conduction. | **Chapter 4** From **Cengel** |
| Week 6 | Introduction to convection transfer | **Chapter 6** From **Cengel** |
| Weeks 7, 8 | External flow forced convection | **Chapter 7** From **Cengel** |
| Weeks 8, 9 | Internal flow forced convection. | **Chapter 8** From **Cengel** |
| Week 10 | Free convection | **Chapter 9** From **Cengel** |
| Weeks 11, 12 | Heat exchangers | **Chapter 11** From **Cengel** |
| Weeks 13, 14 | 10. Fundentals of thermal radiations and Radiative heat transfer. | **Chapter 12 and 13** From **Cengel** |

| Mapping of Course Outcomes to Program Outcomes and NQF Outcomes | Course Outcome Weight (Out of 100%) | Assessment method |
|---|---|---|
| Apply conservation principles and fundamental heat transfer theories (conduction, convection, radiation) to analyze thermal behavior in various engineering scenarios, including steady-state and transient heat conduction and heat transfer in fluids. [1SO1] [1L7S1] | 30% | First Exam |
| solve heat transfer problems involving forced and free convection. [1SO1] [1L7S2] | 40% | Exam2, Final, HW |
| solve complex heat transfer problems involving the modeling and analysis of heat exchangers. [1SO1] [1L7S2] | 15% | Final, HW |
| solve heat transfer problems involving radiative heat transfer between surfaces | 15% | |

| Relationship to Program Student Outcomes (Out of 100%) | | | | | | |
|---|---|---|---|---|---|---|
| SO1 | SO2 | SO3 | SO4 | SO5 | SO6 | SO7 |
| 85 | | | | | | |

| Relationship to NQF Outcomes (Out of 100%) | |
|---|---|
| L7S1 | L7S2 |
| 30 | 55 |

| Evaluation | |
|---|---|
| **Assessment Tool** | **Weight** |
| First Exam | 25% |
| Exam2 | 25% |
| Final | 40% |
| HW | 10% |

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